

Simple brightness models with low-pass and Gabor filters

J M H du Buf, J Rodrigues (Vision Laboratory, University of Algarve, Campus de Gambelas, P 8000-117 Faro, Portugal; fax: +351 28 981 8560; e-mail: dubuf@ualg.pt)

A syntactical brightness model based on a multiscale line and edge representation obtained by a set of anisotropic Gabor filters is quite complex (du Buf and Fischer, 1995 *Optical Engineering* 34 1900-1911). Although only tested in 1-D, it was shown to yield correct brightness effects for many patterns. It has also been shown that isotropic low-pass filters in combination with bandpass ones can account for a specific version of the White effect in which different lengths of the flankin bars can lead to simultaneous brightness contrast as well as assimilation (du Buf, 1992 *Perception* 21 Supplement, 80c). Although not considered in most existing models, low-pass filters are required for creating a brightness background.

Recent experiments have shown that very simple 2-D models, in which the responses of low-pass and Gabor filters are directly mixed, can predict Mach bands, grating induction, simultaneous brightness contrast, and assimilation for many patterns, including the specific version of the White effect. Because such models cannot predict the illusory brightness in the Kanizsa triangle and the Ehrenstein circle, we conclude that the 1-D syntactical model must and can be extended to 2-D, because the multiscale line and edge amplitudes are obtained from the Gabor responses.